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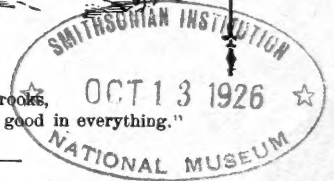
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DIVISION OF FISHES

Vol. IV. U. S. NATIONAL MUSEUM APRIL, 1897.

No. 43.

THE AQUARIUM



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A QUARTERLY

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— FOR —

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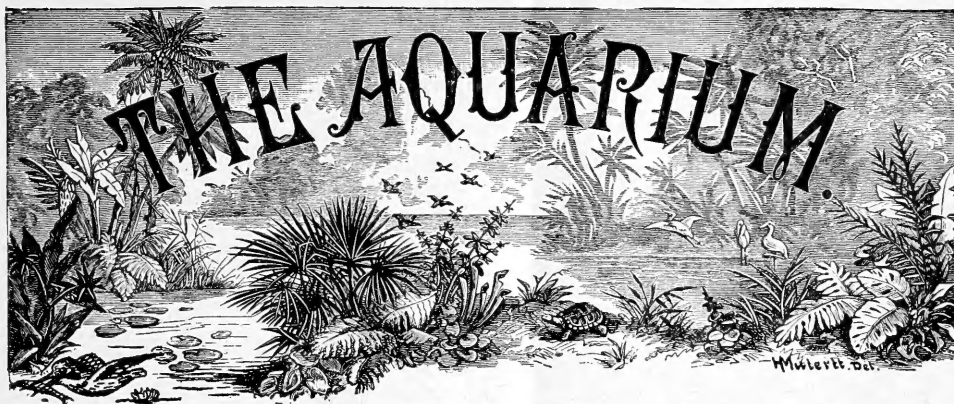
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APRIL, 1897.

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THE CARE OF THE PARLOR AQUARIUM.

We know of nothing more likely to stimulate the mind to healthy exertion, and take it out of the immediate track of common interests and pleasures, the monotony of which is so oppressive, than the study of natural history in some of its least explored fields, especially its extraordinary development in connection with the aquarium. And yet how few there are who seek that charming mode of dissipating the dreary monotony of every-day life, such as it is made by the routine of fashion or habit! A popular love of natural history, even in its best known divisions, is, in fact, of quite recent date. Indeed, the very existence of such a science has been, till recently, altogether ignored by our great national seats of learning. The earnest investigators, who have done so much to lay bare its wonders, were either ridiculed or treated with but small respect—as useless dreamers upon very small and insignificant matters. To appreciate Nature, as well as Art, the mind requires a special education, without which the eye and the ear perceive but little of the miracles

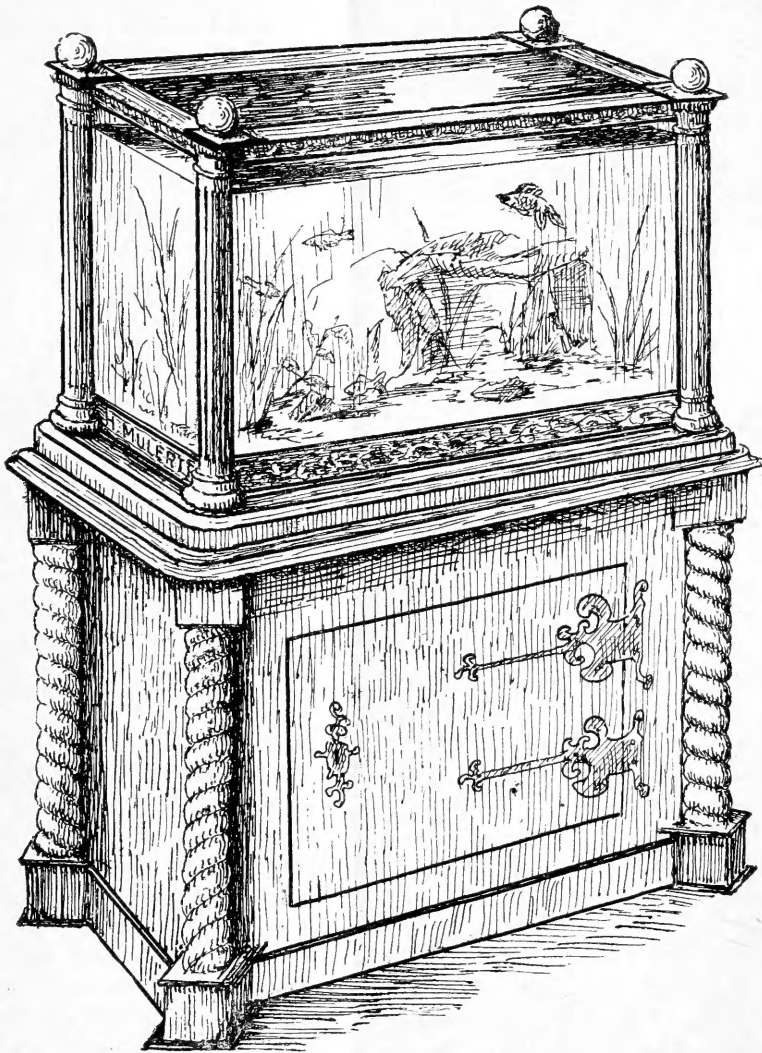
passing before them. Each department of science requires a separate and distinct kind of sight. Those who cannot *see* Nature, who cannot see more than a “funny thing” in a little polywog are like one gazing at a carved Egyptian record, who perceives, in the hieroglyphic character, simply the sculptured figure of a polywog, and no more—they are in a state of Egyptian darkness as regards one of the highest and most enchanting fields of human research.

When, however, the language of Nature is learned, and her voice is no longer a confused murmur to the ear, but becomes a brilliant series of eloquent words, full of deep and exquisite meaning, then the student will *see* as well as *hear*; but till then, in his intercourse with nature, he is both deaf and blind. “Speak,” said Socrates to a youth; “say something, that I may *see* you.” Socrates saw not a silent man; and those who do not hear and understand Nature’s language cannot see her wondrous beauty.

The aquarium has been at all times and in all ages a source of information and amusement for the cultured and rich. Already, thousands of years ago,

the Chinese adorned their houses and gardens with aquariums, the old Egyptians and the noble Romans had theirs, in which they cultivated choice water-

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The aquarium of those days was of course quite different from the aquarium of the present. The manufacture of sheet-glass not being invented then,



AQUARIUM ON CABINET STAND.

plants and fish. During the middle ages we find rare and beautiful fishes and aquatic plants in precious basins in the famous castles of Europe.

the tanks containing the collections were basins formed of costly stones or china, and the contents could only be viewed from above.

THE PRINCIPLES OF THE AQUARIUM.

Whether the scientific principles upon which the success of an aquarium is based were already understood by the ancients, is not known and now hard to prove. At any rate, the present manner of sustaining an aquarium through the action of aquatic plants without change of water, is based on Ingenhauss's discovery, made in the second half of the eighteenth century that "*plants when exposed to the action of light emit an air which he announced as oxygen gas.*"

Fish inhale the oxygen contained in the water and exhale in turn a gas called carbonic acid gas, a very poisonous compound; this the plants inhale, and, appropriating the carbon to build up their own tissues, give off the oxygen again for the fish, so that this gas oxygen becomes but a carrier of carbon from the animal economy to that of the vegetable. When the sun shines on the plants in our aquarium, very often their leaves will be seen to be covered with an innumerable assemblage of minute globules of that gas, glistening like dew-drops upon grass.

Carbonic acid gas is heavier than oxygen. It is the same body that collects in wells and in some of our mines and which is also given off from stoves, often causing disease and death. When this gas is present in too large a quantity the fish feel uncomfortable at the bottom, they go near the surface of the water and finally are forced to breathe the oxygen contained in the atmosphere.

This discovery, like many useful others was from year to year improved, and could these scientists of bygone days see the parlor aquarium of America to-day, inhabited with plants and

animals from every zone of the globe, see fishes and amphibians bred in them, not solely by professionals, but likewise by lady amateurs, observe the joy it creates in the child, the invalid, or the sick in the bed chamber, they would justly feel proud, for they were unknowingly great benefactors to man.

LOCATION FOR THE AQUARIUM.

An aquarium is also very beneficial in improving the sanitary condition of a living or bed room through its purifying influence on the atmosphere. All the impurities of the air are absorbed by the water, this is in turn purified by the plants and the water evaporating into the room is perfectly pure.

As we have seen above, the foundation of an aquarium is the plant life. When one has concluded to get an aquarium into his house, the first thing that should be considered is the location of the tank.

The best side of a room for the aquarium is that having a window near which it is to be placed, as the light can be increased or reduced by regulating the shades accordingly. The best exposure is that towards the North; by such an exposure the aquarium should stand about six inches away from the window; next best is one towards the East, the best distance in such a case is about twelve inches from the window; next best is a window facing South or West, here set the aquarium about eighteen inches towards the room, and when the windows are high even more space may be left between (see illustrations pp. 86-88).

When an aquarium is to be located between two windows, it should be far enough in the room to receive the light from both, and in a corner room with

windows at both angles, the aquarium should be set diagonally so that the light from each window will enter the aquarium from each end.

But, although we want plenty of light for the plants, we should avoid as much as possible the sun. In winter allow all the sunshine you can get, but towards the spring, from February on, shelter the tank from his direct rays. The most favorable temperature for the welfare of the collection ranges between 60° and 90° F.

THE TANK.

When we have chosen a place for the aquarium the next step is to secure a tank. The best tank is the rectangular one, metal frame with glass sides and ends and glass or slate lined bottom. This tank is placed on a stand, table or bracket of proportionate height to secure proper light for the plants and to allow an easy inspection of the contents.

When the tank is secured it is properly cleansed with clean water and a sponge, but without the aid of soap, and filled up *to the top* with water to test the resistance of the glass and to detect any leaks. In making this test the tank should be in a perfectly level position, and of course not in a carpeted parlor.

ARRANGING THE COLLECTION.

Having stood the test it is now placed in its position, care being taken that it sets perfectly level. Now get the washed rocks or tuff-stone intended for the rockery ready, put a sufficient quantity of well washed sharp sand on the bottom of the tank to cover it to the height of about one inch.

This done, seat yourself in a chair

some distance away from the aquarium, look at it, and study the best effect regarding the arranging of the rocks. Don't be in too great a hurry; remember that this arrangement is to be for at least one season, and don't forget that you must make allowances for the plants, making as little shade for them in placing the rocks as possible. The arrangement of the rocks being completed, the next move is the planting of the plants. Since we know that these are the prime factors for the maintenance of the aquarium, this should be done with great care.

The plants may be well rooted specimens or mere cuttings, in either case handle them gently, do not bruise or break them. Plant them in the sand with the same care as you would a tender seedling plant in your garden, arranging the different groups according to the picture you had made in your mind when you sat in the chair thinking about the rockery. An aquatic garden can be made a charming little sub-marine landscape, prettier than any picture. Be not "close" when you make your selection of plants for the aquarium, it would be "penny wisdom," as the success of everything depends on them. They need not necessarily be expensive plants, some of the commoner species being excellent oxygenators, but since plants, outside of their purifying faculties, add greatly to the attractions of an aquarium, liberality in this direction is well placed.

Whilst you are planting, sprinkle the plants every few minutes with water, so they may not suffer from the dry air. All being planted, the next thing to do is to place some small stones or large pebbles in an *apparently* careless manner on the bottom, some in the immediate vicinity of the plants to

steady the roots of them, while others are placed in groups of threes or fours together, leaving small crevices between each stone to catch the refuse matter that will collect in time.

FILLING THE TANK.

The aquarium is now ready to receive the water. If you live in a city that has waterworks, use water from the hydrant, provided that it is clear; if you cannot have that, take clear cistern or spring water, but the water must be clear and fit for anybody to drink. Any water that you would not like to drink yourself is not fit for an aquarium! Muddy water is as detrimental to aquatic plants as dust is to garden plants. If the water is less than 60° F., some warm water should be added, as otherwise the plants would get chilled. Pour the water into the tank slowly and carefully, in order not to wash out the roots of the plants, filling it up to within two inches from the top. Now take a small stick, and by its aid carefully arrange the branches or blades of the plants to suit, then sprinkle a pinch of common table salt on the surface of the water and your aquarium is started.

STOCKING THE AQUARIUM.

If you wish to do so, you can place the fish in the water at once, but if there is no particular hurry, it is advisable to wait a day or two, in order to have the water settle and to give the plants a chance to straighten up and have the sand settled about their roots. After elapse of that period you will see most of the plants covered with minute silvery bubbles, these are oxygen bubbles and you may consider your tank charged with same and in perfect condition to support animal life. Now take the

wiper, which is a sponge fastened to the flat end of a stick, and slowly wipe the inside of the glass of the aquarium, making the motion up and down, avoid touching the sand as this would scratch the glass. The aquarium will now appear as clear as if it contained no water at all. Now introduce the fish gently, one at a time, getting them gradually used to the temperature of the water by slowly mixing it with the water in which they were, then add to your collection two or more frog tadpoles to consume the refuse and otherwise decaying matter and also a few pond snails of the ramshorn type, for the same purpose.

NUMBER OF SPECIMENS.

The question, how many fish can live in an aquarium of a certain size, is equal to, how much money must a man have to be rich—the answer is substantially the same. The shape of the tank and the location in which it is placed determine the number of fish that can comfortably live in it. Should the location be bad as regards light, the amount of oxygen generated in the tank will be less, while if the situation is highly favorable in every respect, the evolution of the life-giving gas will reach its maximum degree. The quantity of water required for a given number of fish is furthermore regulated by their size and the nature of the treatment they have received before they came into your possession. If, for instance, they were kept in running water, or were newly caught in a large pond, they will naturally require a much larger quantity of water than if they had already been accustomed to a life of captivity. Some fish need a great amount of oxygen while others get along with remarkably little. An aqua-

rium will stand as many fish as the plants can supply with oxygen.

The only way to ascertain the ability of a tank is by beginning with a few specimens, adding from time to time until you see by the action of the fish that you have arrived at the limit.

Fish, in order to be objects of study or enjoyment, should above all things feel comfortable and happy; they must feel "at home," and it is much the better plan to keep only a few choice specimens (of a noble type and good habits) and make real pets of these, than to crowd the tank with indifferent stock.

For an aquarium holding from five to twenty gallons of water and kept for ornamental purposes, two handsome specimens of equally proportioned sunfish, for instance, strawberry bass; or a pair of brook trout; or two gorgeous Japanese fringe-tail goldfish; or a pair of golden tench, make a striking effect. A similar good effect is obtained if such a tank is stocked with about five fish of different varieties of the same species. Tanks of the author were seen by millions of people at the various industrial expositions during the last twenty-five years where we had them displayed, and we had good opportunities to notice which arrangement was the most admired. Such a tank as mentioned above brings the arrangement of the rockery and the plants to full notice. The fish appear like so many cattle in a pasture with the edge of a piece of forest as a background. The whole is a living picture continually changing, but always charming. Its perfect silence rests our nerves and imparts a peaceful feeling.

If the aquarium is to be a source of information to children or pastime for invalids, a different course is to be taken and the collection should com-

prise various species of fish in order that the different forms, habits and structures may be compared and studied.

GENERAL MANAGEMENT.

There now remain a few remarks to be said in regard to the general management of an aquarium. We say a few remarks, because if the aquarium has been properly started, it almost takes care of itself, all that is necessary is to feed the fish regularly every day. One person only should have charge of this, and the fish should be fed as nearly as possible at the same period. Allow for each fish a mouthful of food each feeding time. Should any unconsumed food remain at the bottom the tadpoles and snails will devour it. Once or twice a week the inside of the glass should be cleaned with the wiper, thus preventing algae covering it and obstructing the view. This is a flat sponge or thick piece of felt securely fastened to an appropriately shaped metal plate on the end of a stick, or on the flattened and wider end of the stick itself. At the same time the water lost by evaporation should be replaced.

Once a week the sediment that has collected between the pebbles, introduced for this purpose, should be removed by the aid of a glass dipping tube or a rubber syphon. Sand that has been displaced by the fish, laying the roots of the plants bare, is returned to its proper place with the dredge. This is a little scoop-like instrument of metal, fastened at right angles to a long handle.

Some times it happens that a plant is pulled out of the sand by the fish, or accidentally by a visitor; such a plant should be replanted without delay.

Use the dipping tube to hold it down at the roots while these are being covered with pebbles and sand with the dredge.

Especially useful are these aquarium tools during the winter months, when the water is chilly, as they make it unnecessary to put the hands into the water at all.

RE-ARRANGING THE AQUARIUM.

When the aquarium is to be thoroughly cleaned and re-arranged, which should be done once or twice every year, the water is drawn off with a rubber syphon to within about six inches from the bottom (this water, if practicable, is saved and used again when the tank is re-filled. The older the water, the better. The author has used water for eleven years in this way). Next take out the rockwork, then all the plants, also the larger pebbles, and now carefully catch and remove the fish, etc., placing them in a clean tin vessel with *plenty of water* of suitable temperature. Take out the balance of the water now and also the sand, but do not move the tank from its position. After washing the sand particles off the inside of the glass to prevent scratching, clean the entire inside of the tank by rubbing it with ordinary table salt, using the fingers instead of a brush. All the brownish or green matter being taken off, the tank is once more washed with clean water and is then ready again for re-stocking.

The sand should be well washed in various waters until perfectly clean before it is put back into the tank. Where sand is easily obtained a new supply is preferable.

The rock work, or the rock used for it should be scalded and then washed

in salt water with a rough sponge or small scrubbing brush before replacing in position.

The plants are then looked over and the most desirable ones selected and planted again without delay; the tank refilled, and fish, etc., returned as soon as practicable.

Two or three hours of labor once or twice in a year—what a wealth of pleasure, information and pastime will they bring to a family circle, school room or hospital?

We cannot leave this chapter without calling attention to the old saying: "What is worth doing at all is worth doing well."

FISH GOSSIP.

It is curious how, in looking over old papers, some matter is come across of as great interest at the present time as it was when first given to the public, although, perhaps, the article in question was written long ago. I generally make a note of any point of special information, and a few selections from time to time, bearing on fish, may prove of interest to the readers of THE AQUARIUM.

Some years ago Professor Faraday read a paper before the Manchester Anglers' Association on "The Mind of Fish," in which he stated the following curious circumstance: "A morsel of food thrown into a tank fell in the angle formed by the glass bottom and the front. A skate, the inmate of the tank, made several attempts to seize the food, but owing to the position of its mouth on the under surface of the head, and the closeness of the food to the glass, was unable to do so. It lay still for a while, *as if thinking*, then suddenly raising itself into a slanting

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posture, with head inclined upwards and the under surface of the body towards the food, the creature waved the broad expanse of fins, creating an upward current or wave in the water which lifted the food from its position and carried it right into the fish's mouth."

* * *

In one of the old Transactions of the Royal Botanical Society of Edinburgh is a communication from a Mr. Goodsir, giving a description and a drawing of a vegetable parasite found on the gills of a gold-fish, with a minute account of its form, structure, and mode of fructification. Later on, in 1842, a Dr. Bennett gave an account also of the same to the same society. He said: "To the eye they present the appearance of flocculent matter attached to the gill. Under the microscope two distinct structures were noticed, one cellular, the other non-cellular, the former consisting of long tubes, some filled with granular matter, some empty, the contents having escaped through rupture. This vegetable growth sprang from a fine granular amorphous mass." Professor Muller, of Berlin, in a paper read before the Academy of that city in 1841, alluded to similar parasites evidently. He said: "Possessing a life which is peculiar, but having no power of movement." He calls them organic

beings like plants, with a structure perfectly distinct from the celluloses of animal tissue.

* * *

The following is from a paper on the habits of fish, author's name not given:

"Fish are of nearly the same specific gravity as water, and so have little tendency to rise, but swim up or down with equal facility. Nature, however, supplies them with a sufficient supply of some substance lighter than water by which any tendency to sink at all ordinary depths might be counteracted. This is provided against by an amount of fat or oil with which they are furnished, and which being in about the same proportion to the solid parts to bring them to about the same specific gravity as water, supersedes in them the necessity of making any efforts except for the purpose of changing their situation. The air bladder modifies their buoyancy, whilst among the *cetacea* the oil as blubber serves as a substitute. This air bladder, moreover, is wanting among the cartilaginous fish, and many of those that lie in mud. Its principal use seems to be to increase or diminish their weight and to modify their specific gravity."

H. B. SMALL.

OUTLOOK OF THE WATER LILY.

There is at present as never before, in every pursuit in life an awakening battle-cry against luxury, together with a growing tendency, whether for manual labor or material, to inaugurate real merit and quality at the expense of the unqualified and spurious. And nowhere is this truth receiving more substantial recognition than in the various branches of agriculture.

There is a manifest inclination towards centralizing on a few reliable varieties of fruits, flowers and vegetables, discarding the numerous inferior sorts. The watchword is for a plant that gives the greatest results with least outlay. Merit alone—not advertising or special hobbies—shall be the only criterion by which a plant is sustained. The people's plant—the beau-ideal of horticulture—must have not only theoretical advertising points but a substantial combination of practical excellencies, as,

gained universal admiration in growing, crowded and overflowing nations, long, long before young America was born, and she, too, must step into ranks and follow the example of the more frugal Orient.

The entrancing beauty, grace and fragrance of the water lily has been the watchword of the poets and artists throughout all time; but the powers of the pen and brush are inadequate to give it justice; and if the half were told it would be considered a fancy



EUROPEAN WATER LILY (*Nymphaea alba*).

for instance, in floriculture a plant must produce not only an abundance of beautiful flowers but have the qualities of ease of culture, economy of space, and usefulness. Such a combination is not possessed by every flower, in fact by very few; but there are those which, when measured by this unbiased ordeal, will survive the test and be standards in a new horticulture. One of these is the Water Lily. Ever since the dawn of creation it has proven its efficient worth and

sketch or exaggeration. "The proof of the pudding," however, "is in the eating," and here the reality eclipses the most vivid conceptions of the imagination. Search the poetry of the ages and nations and condense all the finest expressions into a descriptive rhapsody, then cast your eyes upon the reality—a water lily pond in all its glory and admit that language can never portray a true conception of its wondrous beauty. But its paramount beauty needs no praise; let us glance at other

points of excellence which combine to make it the plant of the million.

Their Ease of Culture.—Proverbially they are the easiest cared for of all flowers. Plant and the work is done. No hoeing, weeding or watering necessary. When once established they glory in the drouth and rejoice in the floods. A superabundance of the finest of flower on every occasion, without care or attention, is a specialty of the Water Lily family. They never become troublesome or pestiferous in ponds, and can be easily eradicated when desired.

Next, Economy of Space.—Water lilies grow where nothing else will, spreading out their lovely foliage to hide the ugly mud hole, animate the lonely, naked pond, and fringe the monotonous lake, yielding a rich harvest of beauty, health and pleasure from places otherwise unsightly, unhealthy and worthless.

The curious cactus may lie roasting on the barren rocks or the hidden wastes of the desert sand, and the smiling orchid perch itself on the naked branches of the lofty tree, but nothing save the water lily can embellish the millions of beautiful lakes, streams and ponds dotted throughout our land.

But in thinking of their simplicity of culture and unusual beauty, we must not forget their usefulness. "For meat and medicine" they have ever been renowned, and in our own age they may be made the most useful of all our ornamental plants. In systematic fish culture, aquatics generally, and especially such as yield an abundance of seed, are indispensable. With this, as other successful pursuits, scientific accuracy, combined with practical utility, is the watch-word; and the idea of attempting to grow nice,

wholesome fish in stagnant ponds, pools or hatcheries, with their whole surface exposed to the boiling sun, and not a trace of vegetable matter for the fish to forage on, is utterly inconsistent, as well as unprofitable and unhealthy.

It seems to be the divine purpose and object of the Creator that water plants should meet the necessities of water animals. They are mutually dependent upon each other just as terrestrial plants and animals are. But this subject has already been thoroughly discussed, and we shall note no other use of the water lily, which alone, regardless of all its other desirable qualities, will make its culture in this country a universal necessity.

It is not a well-known, but, however, a thoroughly established fact, that aquatics are a certain preventive of the various germs of malarial fevers. Such diseases have their origin from decaying vegetation in low, swampy places and stagnant water. The water lily is at home in such places, neutralizing the poisonous germs and absorbing the effluvia that give rise to these diseases, and finally destroying their habitat. This is a question of general and national interest and is sure, as soon as better understood, to promote the water lily to universal esteem.

Then can we not see in the water-lily a combination that cannot be broken down, a plant whose merits cannot be overrated or its virtues too highly sung—the culmination of every point that could be desired in the beau-ideal of horticulture? Who can for a moment trace its history through the last four thousand years and see its identification with every civilized tongue and doubt for a moment its possibility in our own discreet American land?

GEO. B. MOULDER.



SAGITTARIA
"FRANCES M."

H.M. 96.

ONE INCH



SAGITTARIA
"FRANCES M."

SAGITTARIA "FRANCES M."

Having waited patiently eight years for an opportunity to cross *Sagittaria lanciolata*, a large flowering sub-tropical species of the arrowhead family, with Sag. "New Era," a seedling of Sag. natans, we finally succeeded in getting the two species in flower at the same time seven years ago this spring. The products of this cross-fertilization are our seedlings "Frances M" and "Windermere." The latter is a slow grower and has not yet flowered, while the former is a good grower and very free bloomer, bearing flowers nearly eight months in the year.

It having been our aim to produce a desirable aquarium plant, which, in addition of being a good oxygenator for the self-sustaining parlor aquarium, would also have an ornamental character; we have so far restricted our observations regarding the "F. M." to in-door culture, and especially just such culture as the amateur aquarist, for whom it is intended, can give. The possibilities, what it can or will do in an aquatic greenhouse or in an open air pond, is yet to be tested.

The general habit of the plant is that of Sag. "N. E.," its father, but its proportions are a great deal larger. During the season from November till February, the growth consists of blades, rich green in color. These remain entirely below the surface of the water. They are from one to one and a half inches in width and from six to eighteen inches in length, nicely veined and netted and gracefully curved.

With the approach of spring, in March, the aerial leaves appear above the water. The first one is narrower and stiffer than the submerged blades; all others that soon follow are distinctly lanceshaped and are born upon

a triangular stem. These rise to about twelve inches above the water level. After the third aerial leaf is perfected, the flower stalk makes its appearance, rising to about ten inches above the water where it opens its showy but delicate flowers. The individual flowers are larger in size than a quarter of a dollar; its three petals are pure white, with wavy edges, the stamens being a rich yellow.

The first flower spike is soon followed by others until late in the fall, when the aerial leaves shrivel up and the plant begins its winter growth below the water surface.

One of our plants had seventeen spikes of flowers last season. The accompanying sketches were made from specimens in our parlor aquarium. They are growing in pure sharp sand, the tank being near a window with an eastern exposure, and is allowed to have some sunlight occasionally.

The one column sketch shows the underwater growth (the blades) its mode of reproduction, the abovewater growth (the leaves), and the flower stalks of the plant. On the full page cut a single leaf of the plant and a flower spike, showing the forming fruit and the male flower, is represented.

ADVANTAGES OF PHILOSOPHY

It's wrong to worry, I expect,
About spilt milk. We orter
At such times gladly recollect
'Twas over two-thirds water.

— L. A. W. *Bulletin*.

A prominent feature of THE AQUARIUM is that questions pertaining to the management of an aquarium or houseplants, are answered to its subscribers by mail. If the case requires it, the answer is sent by *return mail*. Single copies 25 cents; \$1.00 a year.



NATURE-STUDY FOR PUBLIC SCHOOLS.

Nature-study, or seeing familiar things in a new light, is a valuable factor in education. How many people can explain, so that a child can understand, why water puts out fire, why some young squash plants bring their shells out of the ground on their backs and others do not; or show the difference between a leaf-bud and a fruit-bud of the apple; or tell from whence all the house-flies come? The world is full of such common things, about which people do not inquire. Yet, such subjects can be made very interesting to children, and they can be taken up in the schools, not as an added recitation, but as a rest exercise once or twice each week to relieve the monotony of the school room and later be made the theme for a language exercise. Here are two important faculties that may be brought into exercise—accurate observation and the power of expressing definitely what is seen.

The College of Agriculture of Cornell University has, under the Nixon or Agricultural Extension bill, undertaken to assist, free of expense, all teachers who wish to introduce this work into their schools. All parents and teachers interested in this work are asked to send their address for more detailed information to

CHIEF CLERK,

College of Agriculture,

Ithaca, N. Y.

All the varieties of goldfish, carp, tench, orfes, dace, shiners, suckers, minnows, sunfish, rockbass, strawberry-bass, moss and blackbass, the paradise and the zebrafish, all the species of catfish, and the tadpoles enjoy to eat our "I. X. L." fishfood and thrive on it. The sticklebacks and eels, also the newts, do not appreciate it, however.

Two small or medium sized aquariums are easier managed than one of large size and afford twice as much pleasure. Except for special purposes, a tank of twenty gallons capacity is as large a one as any private party should undertake to manage. The care of a larger tank ceases to be a pastime; at times it requires such attentions that it comes pretty close to hard work.

With the approach of the warm weather, the paradise fish should be fed frequently with scraped raw beef, fragments of young (small) earthworms, and, where it is practicable, with live flea crab (*Camarus pulex*), or other small crustaceans, in order to get them into prime condition for breeding.

After the female paradise fish has deposited her eggs, it is the safest plan to remove her to another tank, or at least separate her from the male by a glass partition. When the young are ten or twelve days old, she may be returned to spawn a second time, after which the same precaution should be taken. Not more than two broods should be raised in one tank, because the first brood would devour the third as soon as hatched.

Young goldfish and paradise fish can be raised successfully on our IXL food. It should be powdered and given to them four or five times a day.



OUR ALBINO FROG has passed the winter very nicely. Its pale cream color which it was predicted by some of our readers "would soon change back into a natural frog color" has not changed in the least, and its pretty pink eyes are as charming as ever.

THE AQUARIUM SOCIETY is the name of a new society for the advancement of aquarium and terrarium culture. It was organized last December at Jersey City, N. J.

The society numbers already many enthusiastic members, including one lady. Article III of their Constitution relating to memberships reads as follows:

Section 1—The society shall consist of three classes of members: active, corresponding, and honorary.

Section 2—All persons over 16 years of age are eligible to active membership.

Section 3—All persons coming within the provisions of section 2, but residing beyond a radius of fifteen miles from New York City Hall, shall be eligible to corresponding membership.

Section 4—Honorary members shall be such persons who have distinguished themselves by having rendered valuable assistance to the society in furthering its object generally.

Section 5—Dealers shall not be debarred from membership; it must be however definitely understood that they are not to use the fact of their membership as an advertising medium, and that they consider the members privileged parties and grant them reasonable concessions.

Article V., relating to annual dues, reads as follows:

Section 1—The initiation fee of active members shall be one dollar, payable on notification of election.

Section 2—The annual dues of active

members shall be one dollar and twenty cents, payable monthly.

The list of officers is :

Eugene Smith, President,
F. C. French, Vice-President,
Geo. Baehr, Secretary,
W. Spicer, M. D., Treasurer,
R. Breetz, Financial Secretary.
P. C. A. Graupner, Librarian.

The meetings will be held on every second Thursday of the month at the German-American School Building, Jersey City Heights.

AT THE ROYAL PRUSSIAN seminaries for teachers a three-years' course in the art of gardening has been introduced as a regular study for all. Gardening in all its branches—kitchen, fruit and flower gardening—is taught theoretically and practically. A professor teaches the theory, and the laboratory work (work in the garden) is conducted by a trained gardener.

The young women who wish to become teachers in public schools have to pass as rigid an examination in gardening as in any other branches of their study.

The course is highly enjoyed by the students. The usefulness of this course is manifold. Teachers so trained can not only instruct in botany, but are enabled to give proper care to the house plants which the Prussian authorities order to be grown in *at least* one window of each class-room. It facilitates them to intelligently cultivate the garden, which is, in nearly every case, attached to the school house, and which provides many commodities for the teacher. Last, not least, the schoolma'am, who, no less than the schoolmaster, is looked upon as an authority in all things by the people in Germany, will now be able to give correct advice in many things relating to this useful occupation.

UNDER THE AUSPICES of the "Triton," a society for the advancement of aquarium and terrarium culture, at Berlin, Germany, a public exhibition of all sorts of live stock for marine and fresh water aquariums, temperate and tropical terrariums, tanks, cases and the various supplies and apparatus used in connection with this

scientific pastime, will be held at the Winter garden of Hotel Central. It will open June 12th and continue for ten days.

Their exhibitions were always very attractive, presenting rare novelties and new ideas. Judging from the premium list now before us, this one will eclipse all the others the society has held.

Those of our readers who visit Germany this summer should arrange to see this exhibition. It will be a treat to them.

SOWING SEEDS.

Too deep planting is a fruitful cause of failure with amateur gardeners. The depth of the soil must be proportioned to the size of the seed. *Petunia*, *Primula*, etc., require the least sprinkling of sandy loam.

A good general rule is to cover the seed only to the thickness of their own diameter, yet this would not hold good with Sweet Peas, for they grow better when planted three inches in depth.

With very fine seeds it is best to press them lightly into the surface of the soil with the fingers, then shade from the sun three or four days either with cloth or newspapers, and sprinkle over the coverings, not letting them become dry at all, yet not killing the germ of the seeds by too much water.

Hard shelled seeds, like canna, acacias, cypress vines, etc., will germinate much quicker if they are soaked in boiling water for an hour or so. Turn it upon them boiling hot, and let it stand until cool, then plant the seeds. Some gardeners prefer to pour boiling water upon the surface of the soil prepared for them, rather than upon the seeds. Either way will succeed, but it is essential to soften the horny substance which envelops the seeds if you desire them to grow.

—*Window Gardening.*



For the small sum of one dollar in advance, which pays for a year's subscription to *THE AQUARIUM*, you are entitled to ask information on any point regarding the aquarium or the window garden. We offer no other premium to our subscribers than that of putting over 25 years of practical experience in these branches at their disposal. Ask as many questions as you please, but please to enclose postage for reply. All questions are answered by mail, and we publish only such in these columns as are of general interest.

Mrs. L. K.—If you let the sun shine upon your tank any length of time, you will find that the water will discolor and the glass sides of the tank will become covered with green algae, which, although very beneficial to the health of the fish, is very annoying.

As the welfare of the entire collection depends upon the proper action of the aquarium plants, it should be avoided that these are in any way molested by the fish or anything else. If one or the other of your fish takes to the habit of eating or pulling up plants, remove it at once from the collection. Irregular and insufficient feeding develops this habit.

Yes, German carp are vegetarians to a certain extent and, therefore, not a desirable fish for an aquarium or lily-pond; they are too destructive in such places. Our IXL fish food contains vegetable matter in the right proportion and supplies the fish's wants as closely as can be expected of an artificial food.

ELMHURST.—Clean, sharp river or sea sand is the best material to form the bed in an aquarium. All aquarium plants grow in it to perfection. Earth, peat, etc., as the foundation of the sand bed, has many disadvantages. The fish will dig it up, and one need never look for the water to be clear. Fish require the sand to clean their mouths and gills. Gravel (pebbles

would be cleaner, that's true, and possibly handier, but this would not answer the purpose aimed for.

Some aquatic plants, for instance *Limncharis*, *Aponogeton* and *Nymphaea flava*, grow only to perfection and bloom in an aquarium when planted in rich soil in pots (fern pots), or yet better in glass salve jars. In this exceptional case, the surface of the soil is to be covered with clean sand and rocks and pebbles to keep the fish from digging.

Mrs. M. N. O.—Just why the all-glass aquariums crack is hard to say; they may not be uniformly tempered, or because the thickness of their walls and bottoms differ, which makes an even contraction and expansion impossible. The fact remains, they are unreliable at their best.

Why we don't manufacture the hexagon or octagon tank? Because there is very little, if any, call for that shape. Except where such a tank is to be used as a fountain basin in a hall or large bay window, it would be very inconvenient. In tanks of such shapes there is too much light and not enough rest for the fish. The "face" of the tank is too small, and it requires more than double the number of stock to make the same display that a rectangular tank of the same capacity would make.

Mrs. A.—If you wish to breed goldfish with a view to profit, our advice is to begin with one pair or with one set (two females and three males) of only one variety. Everybody needs some practical experience until he can expect to be successful at anything. This is especially the case in fish breeding. Buy one or two year old fish, get these to spawn, raise the young, and next fall when you find that your experiment was successful, buy two or three choicer varieties and breed from these next season. This, we find, is the least expensive and surest way to success.

J. W. F.—A cylinder, twenty-four or more inches in diameter and three inches higher than the depth of the water, made of galvanized wire netting, $\frac{1}{4}$ inch mesh, and painted with asphalt paint, will make a good inclosure for gold or paradise fish in a lily-tank.

